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ABSTRACT

The design and implementation of a complete, computerized retrieval system for the engineering and architectural drawings and maps of several large land development firms are discussed. Such collections present unique problems to the cataloger. Each collection is limited in geographic scope to the land owned or developed by the firm; types of maps or drawings vary greatly; and each collection has its own specialized vocabulary and identifiers. Generalized cataloging systems or established subject headings are virtually useless in such highly localized and specialized collections. The problems encountered and the process followed in developing a specialized cataloging system and format, a customized thesaurus, computer software, and managerial procedures for the first system is detailed. The adaptability of this system to other engineering and architectural drawing collections is also discussed. (Author)

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A RETRIEVAL SYSTEM FOR ENGINEERING DRAWINGS

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A RETRIEVAL SYSTEM FOR ENGINEERING DRAWINGS

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Engineering and architectural drawings cost hundreds of dollars to create, yet, once created, they are rarely effectively organized or cataloged for retrieval. A survey of engineering firms and land development corporations in Southern California revealed no completely satisfactory cataloging scheme or effective computer-assisted retrieval system for their maps and drawings.[1] The importance of these plans and the necessity of having access to them was recognized by all, however.

Maps and drawings cover all phases of land development and access to them is essential to many departments in a company, to landowners, and to government agencies. These plans are in constant use in the planning process and each type of drawing must be consulted before the next type is drawn.

Aerial photos reveal what the land looks like now and what has been built in the past; topographic studies locate physical features and show which areas are best suited for various land uses; general plans ensure the organized and lawful growth of an area; boundary plats pinpoint exact boundaries of projects; planning studies record for the architect and designer the development of a structure's design; and blueprints guide actual construction.

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[1]This survey and literature search was conducted by Pamela Cibbarelli in 1974. It consisted of questionnaires, telephone surveys, visits to several plan vaults and a complete review of the literature.

Local, state, and federal regulations require the filing of numerous drawings and maps before developments are approved. Access to plans of approved projects is required to deal with changes in ownership, natural disasters, lawsuite, or in planning surrounding communities.

To provide access to these important, but often neglected collections, the design and implementation of a complete, computerized retrieval system for the engineering and architectural drawings and maps of several Southern California land development firms was undertaken by the library and information consulting firm of Cibbarelli and Associates.

The Irvine Company

The initial development of this retrieval system was for the Irvine Company. The Irvine Ranch is a 130 square mile combination of three old Spanish land grant ranchos in the heart of Southern California. In a 1974 publication, the Urban Land Institute offered this descriptive synopsis of the importance of the Irvine Company:

> The 130 square-mile Irvine holding is the site of the largest and most diversified privately-owned, master planned new community currently underway in the United States. It is not only its 83,000-acre size that gives Irvine its unique status--it is its location. The property straddles Orange County at its center, occupying 17 percent of the county's 782 square miles. Irvine lies in the path of the population push from Los Angeles, 40 miles to the north, to San Diego, 80 miles to the south. Riverside and San Bernardino are 40 miles east. It is becoming the hub of Orange County at the center of Southern California's five major metropolitan areas, where over one-half of the state's people live.[2]

The Irvine Ranch stretches 22 miles from the Pacific Ocean through the Santa Ana mountains and includes parts of many Orange County cities.

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[2]Nathaniel M. Griffith, Irvine: The Genesis of a New Community. (Washington, D.C.: Urban Land Institute, 1974), p. 6.

Only 15 years ago this land was primarily agricultural or recreational, it now includes industrial, commercial, academic, residential and multi-family developments as well. The population of Orange County has doubled three times between 1940 and 1970. It is expected to have doubled again by 1980. Nearly 2 million new people will have arrived in Orange County during this period.

Careful planning for an increasing population and for all types of terrian, activities, and living are the basis of the Irvine Company's unique planned communities. A wide variety of maps, drawings and plans are essential in all phases of this mammoth planning activity.

The Plan Vault

When Cibbarelli and Associates was called into the Irvine Company's Planning Department to study the reorganization of the rapidly expanding Plan Vault, the situation was barely tolerable for a small company's vault, and clearly intolerable for a company of this size. An initial inventory revealed some 10,000 drawings as diverse as the planning process and the Irvine Company's operations. Numerous haphazard and unrelated "retrieval systems" had been initiated--no one of which was complete or satisfactory. Retrieval generally relied on the very excellent memory of the 10-year veteran file clerk. Many of the drawings had been stored years ago and not looked at since. Extensive weeding was required. Other drawings important for future development or legal proceedings had become "lost" in the uncataloged vault.

Too many new or revised older drawings were filed daily, too much time was spent searching for drawings filed in the past, and there were too many rush requests for prints of existing drawings for the overburdened

file clerk to enter new items into her plethora of notebooks, file cards, and Termatrex systems. The rapid growth of the Irvine Company's planning and building operations had clearly outpaced the operation of the Plan Vault--yet, it was such a center of activity there was no time to internally develop a better system. A professional and comprehensive retrieval system that required a minimum of clerical upkeep time was clearly needed.

Retrieval System

Determination of the elements to be retrieved in each drawing, design of an easy-to-use cataloging system, and determination of the user's and cataloger's needs were essential first steps in the design of an effective retrieval system. Extensive meetings with departmental personnel led to the identification of information necessary for inclusion in the cataloging system and identified numerous areas of concern.

It soon became clear that such collections have unique needs and present unique problems to the cataloger. Each collection is limited in geographic scope to the land owned or developed by the firm; types of maps or drawings vary greatly; and each collection has its own specialized vocabulary and identifiers. Generalized map cataloging systems or established subject headings are virtually useless in such highly localized and specialized collections. Complete access to every identifiable concept in each drawing is essential in the effective retrieval of items in such collections. A review of systems in use in similar situations revealed none that met all of the special needs of the collections. (See Bibliography)

A list of information elements to be included in the cataloging of of every map and drawing was finally determined. These elements included:

--Title (What was actually lettered on the map plus further identifying descriptions in parentheses)

--Type of drawing (i.e. aerial photo, improvement drawing, general plan, etc.)

--Originating authors or agencies

--Geographic level of drawing

--Material

--Scale

--Size

--Date of drawing and revision dates

--Number of sheets in a set

--Location of drawing (To allow for future cataloging of materials throughout the company)

--Work Request number

--Block or Section numbers (These pertain to a geographic grid system that identifies areas of the Irvine Ranch)

--Multiple subject headings

Computer-Generated Catalog

The lack of clerical support hours available and the need for an easily updated system led to the early decision to make this retrieval system a computer-generated one. An on-line system was decided against at this time because of the greater expense and the Irvine Company's lack of appropriate hardware. A computer produced catalog to be frequently updated and with the flexibility to add special searching capabilities in the future was decided upon. The programs were written with extensive programmer-librarian interaction, resulting in a product that fully reflects the cataloger's, clerk's, and user's needs. Developing software to fit the information needs rather than bending information needs to meet

existing software is an essential key to the success of this information retrieval system.

Essential elements of the Irvine Company's Plan Vault software include:

--Easy maintenance procedures

--User oriented, easy-to-read format

--Lengthy data fields so data need not be abbreviated

--Use of natural language instead of codes

--Controlled vocabulary with unlimited addition of cross references

--Flexible number of subject headings for each drawing

--Inclusion of all important elements even though sorting is only by call number and subject headings

--Ability to allow additions and changes to the system

With the completion of the programs, a single final coding and keypunching form was developed. Cataloging could now be done directly onto this form. Another form was developed to facilitate entry of a new drawing into the retrieval system. This "Request for Filing" form asks the author of the drawing to supply information about each map or drawing. This greatly speeded the cataloging process. Cataloging now takes a librarian or the experienced file clerk approximately ten minutes for each map set. The cataloging process follows the orderly layout of the "Request for Filing" and coding forms and includes assignment of geographical and numerous subject thesaurus terms.

The Thesaurus

The most important element of any retrieval system is, of course, the subject headings assigned. The creation of a customized thesaurus and the

decision to include a combination of grographical and subject terms to describe the maps and drawings makes this system unique. Most existing map retrieval systems emphasize geographical access. In a collection of maps, engineering drawings, and architectural plans, such a limited approach is not effective. Use of standard subject headings without regard for geography is also ineffective. The Irvine Company's Plan Vault retrieval system features a combination of geographic and subject terms to cover effectively any aspect of any type of drawing in the vault.

Cataloged items are always assigned the key geographic area depicted in the drawing. The Irvine Ranch is developed with a village concept, where all development is carried on in the separate villages. Plans are always identified with the village name. Each subject that pertains to the item is also listed. Subject headings are then subdivided geographically by village. For example, a topographic map for a future shopping center site that will be located in the Irvine village of Harbor View Hills may be retrieved by the following subject items:

--Harbor View Hills

--Shopping Centers--Harbor View Hills

--Topography--Harbor View Hills

If other things are shown on the plan, or an agency other than the Irvine Company drew the plan, they too will be carried as subject terms. A map can thus be retrieved by anything a user knows about it.

Several useful by-products are also a part of the system. Complete listings of all drawings done for each village, of all drawings created by a certain agency and of all types of drawings are generated. The ability to combine subject terms with Boolean operators to generate a specialized search has also been added.

Other Applications

The development and maintenance of this retrieval system for the Irvine Company has led Cibbarelli and Associates to design its own software for the retrieval of engineering and architectural plans. Refinements to the prototype system have been made and the software was purposely made flexible enough to allow for future changes and to meet the needs of any collection. Before cataloging the drawings in a firm's collection, the needs of the specific firm are studies carefully. Terminology used will vary, geographical breakdowns may be planning areas or cities instead of villages and the size of each collection may be different, but the basic retrieval needs remain the same.

The combination of a customized thesaurus, standardized cataloging rules and software developed specifically for engineering and architectural maps and drawings has made this a highly successful retrieval system. The system's built-in felxibility will ensure its adaptability and success as a wider variety of collections are cataloged.

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